POLIOMYELITIS

DISEASE REPORTING

In Washington

Wild polio was eliminated from the western hemisphere in 1991; the last case identified in Washington occurred in 1977. Vaccine-associated paralytic polio (VAPP) has occurred sporadically, including a Washington case in 1993. In 1997, the ACIP recommended routine use of inactivated rather than oral polio vaccine to eliminate VAPP.

Purpose of reporting and surveillance

- To identify rare diseases associated with travel or immunization.
- To distinguish between wild-type polio and VAPP and to identify susceptible people exposed to either type.
- To maintain indigenous transmission of wild-type poliovirus at zero.

Reporting requirements

- Health care providers: **immediately notifiable to Local Health Jurisdiction**
- Hospitals: **immediately notifiable to Local Health Jurisdiction**
- Laboratories: no requirements for reporting
- Local health jurisdictions: **immediately notifiable to DOH Communicable Disease Epidemiology: 1-877-539-4344**

CASE DEFINITION FOR SURVEILLANCE

Clinical criteria for diagnosis

Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss.

Laboratory criteria for diagnosis

None.

Case definition

- Probable: a case that meets the clinical case definition.

- Confirmed: a case that meets the clinical case definition and in which the patient has a neurologic deficit 60 days after onset of initial symptoms, has died, or has unknown follow-up status.

  All suspected cases of paralytic poliomyelitis are reviewed by a panel of expert consultants before final classification occurs. Confirmed cases are then further classified based on epidemiologic and laboratory criteria. Only confirmed cases are included in Table I in the MMWR. Suspected cases are enumerated in a footnote to the MMWR table.

A. DESCRIPTION

1. Identification

A viral infection most often recognized by the acute onset of flaccid paralysis. Poliovirus infection occurs in the GI tract with spread to the regional nodes and in a minority of cases, to the nervous system. Flaccid paralysis occurs in less than 1% of poliovirus infections; greater than 90% of infections are either inapparent or a nonspecific fever. Aseptic meningitis occurs in about 1% of infections. A minor illness is recognized with symptoms that include fever, malaise, headache, nausea and vomiting. If the disease progresses to major illness, severe muscle pain and stiffness of the neck and back with flaccid paralysis may occur. The paralysis of poliomyelitis is characteristically asymmetric with fever present at the onset. The maximum extent of paralysis is reached in a short period, usually within 3-4 days. The site of paralysis depends on the location of nerve cell destruction in the spinal cord or brain stem. The legs are affected more often than the arms. Paralysis of the muscles of respiration and/or swallowing is life threatening. Some improvement in paralysis may be seen during convalescence, but any paralysis still present after 60 days is likely to be permanent. Infrequently, recurrence of muscle weakness following recovery may occur many years after the original infection has resolved (postpolio syndrome); this is not believed to be related to persistence of the virus itself.

In highly endemic countries, typical polio cases can be recognized on clinical grounds. In countries where polio is absent or occurs at low levels, poliomyelitis must be distinguished from other paralytic conditions by isolation of virus from stool. Other enteroviruses (notably types 70 and 71), echoviruses and coxsackieviruses can cause an illness simulating paralytic poliomyelitis.

The most frequent cause of acute flaccid paralysis (AFP) that must be distinguished from poliomyelitis is Guillain-Barre syndrome (GBS). The paralysis of GBS is typically symmetrical and may progress for periods as long as 10 days. The fever, headache, nausea, vomiting and pleocytosis characteristic of poliomyelitis are usually absent in GBS; high protein and low cell counts in the CSF and sensory changes in the majority of cases are seen in GBS. Acute motor axonal neuropathy (China paralytic syndrome) is an important cause of AFP in northern China and is probably present elsewhere; it is seasonally epidemic and closely resembles poliomyelitis. Fever and CSF pleocytosis are usually absent, but paralysis may persist for several months. Other important causes of AFP include transverse myelitis, traumatic neuritis, infectious and toxic neuropathies, tick

paralysis, myasthenia gravis, porphyria, botulism, insecticide poisoning, polymyositis, trichinosis and periodic paralysis.

The differential diagnosis of acute nonparalytic poliomyelitis includes other forms of acute nonbacterial meningitis, purulent meningitis, brain abscess, tuberculous meningitis, leptospirosis, lymphocytic choriomeningitis, infectious mononucleosis, the encephalitides, neurosyphilis and toxic encephalopathies.

Definitive laboratory diagnosis is made by isolation of the virus from stool samples, CSF or oropharyngeal secretions in cell culture systems of human or monkey origin (primate cells). Differentiation of wild from vaccine virus strains can be made in specialized laboratories. Presumptive diagnosis may be made by fourfold or greater rises in antibody levels; however, type specific neutralizing antibodies may already be present when paralysis develops, so that significant titer rises may not be demonstrable in paired sera. Also, the antibody response following immunization mimics the response following infection with wild type viruses and the widespread use of live polio vaccines makes interpretation of antibody difficult, except for ruling out polio in cases where no antibody has developed in immunocompetent children.

2. Infectious Agent

Poliovirus (genus Enterovirus) types 1, 2 and 3; all types can cause paralysis. Type 1 is isolated from paralytic cases most often, type 3 less so, and type 2 least commonly. Type 1 most frequently causes epidemics. Most vaccine associated cases are due to type 2 or 3.

3. Worldwide Occurrence

Prior to the advent of immunization, polio occurred worldwide. As a result of improved immunization programs worldwide and WHO's global initiative to eradicate poliomyelitis, circulation of polioviruses is limited to a decreasing number of countries. The last culture confirmed case of poliomyelitis due to indigenous wild poliovirus in the Western Hemisphere was detected in Peru in August 1991. Poliomyelitis is on the verge of worldwide eradication. The greatest risk of polio now occurs on the Indian subcontinent and, to a lesser extent, in the countries of west and central Africa. War torn countries in this region where the health infrastructure has been destroyed are at particular risk of epidemics. WHO has set the end of the year 2000 as the target for worldwide eradication, but many experts believe that it is likely to take a little longer to accomplish this goal.

Although wild poliovirus transmission has probably ceased in most industrialized countries, importation remains a threat. An outbreak of poliomyelitis occurred in 1992-1993 in the Netherlands among members of a religious group that refuse immunization. The virus was also found among members of a related religious group in Canada, although no cases occurred. Cases of poliomyelitis are also recognized in industrialized countries among tourists who have never been immunized as well as nonimmunized immigrants revisiting their country of origin. With the exception of these rare imported cases, all of the very few cases of poliomyelitis recognized in industrialized countries are caused by vaccine

virus strains. In the US, 5-10 cases of vaccine associated poliomyelitis occurred each year when oral poliovirus vaccine (OPV) was the primary vaccine used. About half of these cases occurred among adult contacts of vaccinees.

In endemic areas, cases of polio occur both sporadically and in epidemics with an increase in cases during the late summer and autumn in temperate countries. In tropical countries, a seasonal peak occurs in the hot and rainy season, but is less pronounced.

Polio remains primarily a disease of infants and young children. In many polio endemic countries, 70%-80% of cases are less than 3 years of age and 80%-90% of cases are less than 5 years of age. Clusters of susceptible persons, including groups that refuse immunization, minority populations, economic migrants and other unregistered children, nomads, refugees and urban poor are at high risk.

4. Reservoir

Humans, most frequently people with inapparent infections, especially children. Long term carriers of wild type viruses have not been found (see below).

5. Mode of Transmission

Primarily person to person spread, principally through the fecal-oral route; virus is more easily detectable, and for a longer period, in feces than in throat secretions. However, where sanitation is good, pharyngeal spread may be relatively more important. In rare instances, milk, foodstuffs and other materials contaminated with feces have been incriminated as vehicles. No reliable evidence of spread by insects exists; water and sewage are rarely implicated.

6. Incubation period

Commonly 7-14 days for paralytic cases, with a reported range of 3 to possibly 35 days.

7. Period of communicability

Not precisely defined, but transmission is possible as long as the virus is excreted. Poliovirus is demonstrable in throat secretions as early as 36 hours and in the feces 72 hours after exposure to infection in both clinical and inapparent cases. Virus typically persists in the throat for approximately 1 week and in the feces for 3-6 weeks or longer. Cases are most infectious during the first few days before and after onset of symptoms.

8. Susceptibility and resistance

Susceptibility to infection is universal, but paralysis occurs in only about 1% of infections. Some of these patients recover and residual paralysis is observed in 0.1% to 1%. The rate of paralysis among infected, nonimmune adults is higher than that among nonimmunized infants and young children. Type specific immunity, apparently of lifelong

duration, follows both clinically recognizable and inapparent infections. Second attacks are rare and result from infection with a poliovirus of a different type. Infants born of immune mothers have transient passive immunity.

Intramuscular injections, trauma or surgery during the incubation period or prodromal illness may provoke paralysis in the affected extremity. Tonsillectomy increases the risk of bulbar involvement. Excessive muscular activity in the prodromal period may predispose to paralysis.

B. METHODS OF CONTROL

1. Preventive measures:

a. Educate the public on the advantages of immunization in early childhood.
b. As of late 1999, both a trivalent live, attenuated oral (OPV) and an injectable, inactivated poliovirus vaccine (IPV) are commercially available. Their use varies in different countries.

   OPV simulates natural infection by inducing both circulating antibody and intestinal resistance, and immunizes some susceptible contacts through secondary spread. In developing countries, lower rates of seroconversion and reduced vaccine efficacy for OPV have been reported, but this can be overcome by administration of extra doses in supplemental campaigns. Breast feeding does not cause a significant reduction in the protection provided by OPV. WHO recommends the use of OPV alone for immunization programs in developing countries because of low cost, ease of administration and superior capacity to provide population immunity.

   IPV, like OPV, provides excellent individual protection by inducing circulating antibody that blocks spread of the virus to the CNS. Both IPV and OPV induce intestinal immunity. Many industrialized countries switched to IPV alone for routine immunization when it was clear after many years that wild type polioviruses had been eliminated.

   Five individuals with underlying primary immune deficiency disorders have been identified who excreted OPV for 4 to 7 or more years. The significance of these cases with regard to the possibility of eventually stopping polio immunization is under review and studies are in place to look for additional instances in developing countries.
c. Recommendations for routine immunization:

   From 1962 to 1997, OPV was the vaccine of choice for routine immunization in the US. In January 1997, the CDC recommended giving IPV at 2 and 4 months of age and OPV at 12-18 months and 4-6 years of age. Effective January 2000, all children in the US should receive 4 doses of IPV at ages 2 months, 4 months, 6-18 months and 4-6 years. OPV should be used only for the following special circumstances: (1) mass immunization campaigns to control outbreaks of paralytic polio; (2) unimmunized children who will be traveling in less than 4 weeks to areas where polio is endemic; and (3) children of parents who do not accept the recommended number of vaccine injections. These children may receive OPV only

for the third or fourth dose or both; in this situation, health care providers should administer OPV only after discussing the risk for vaccine associated paralytic polio (VAPP) with parents or caregivers. It is anticipated that the availability of OPV will be limited in the future in the US. In developing countries, WHO recommends OPV at 6, 10 and 14 weeks of age. In polio endemic countries, an additional dose of OPV is recommended at birth.

In polio endemic countries, WHO recommends the use of national immunization campaigns that administer 2 doses of OPV, 1 month apart, to all children less than 5 years of age regardless of prior immunization status. These campaigns are ideally conducted during the cool, dry season to achieve maximum effect. When a high level of control has been achieved in a country, targeted immunization campaigns in high risk areas are recommended.

Contraindications to OPV include congenital immunodeficiency (B-lymphocyte deficiency, thymic dysplasia), current immunosuppressive therapy, disease states associated with immunosuppression (HIV/AIDS, lymphoma, leukemia, generalized malignancy) and the presence of immunodeficient individuals in the household of potential vaccine recipients. (IPV should be used in such people.) However, where polio is still a problem, WHO recommends the use of OPV for infants who may be infected with HIV. Diarrhea is not considered a contraindication to OPV.

When OPV was the recommended vaccine, OPV caused paralytic poliomyelitis in vaccine recipients or their healthy contacts at a rate of approximately one in every 2.5 million doses in the US. In Romania, multiple injections of antibiotics were associated with an increased risk of vaccine associated poliomyelitis.

Immunization of adults: Routine immunization for adults residing in the continental US and Canada is not considered necessary, but primary immunization is advised for previously nonimmunized adults traveling to polio endemic countries, for members of communities or population groups in which poliovirus disease is present, for laboratory workers who may handle specimens containing poliovirus and for health care workers who may be exposed to patients excreting wild type polioviruses. IPV is recommended for adult primary immunization; 2 doses are given with a 1-2 month interval and a third dose given 6-12 months later. Those who have previously completed a course of immunization and now will be at increased risk of exposure may be given an additional dose of IPV.

2. Control of patient, contacts and the immediate environment:

a. Report to local health authority.
b. Isolation: Enteric precautions in the hospital for wild virus disease; of little value under home conditions because many household contacts are infected before poliomyelitis has been diagnosed.
c. Concurrent disinfection: Throat discharges, feces and articles soiled therewith. In communities with modern and adequate sewage disposal systems, feces and urine can be discharged directly into sewers without preliminary disinfection. Terminal cleaning.
d. Quarantine: Of no community value.

e. Protection of contacts: Immunization of familial and other close contacts is recommended but may not contribute to immediate control; often the virus has already infected susceptible close contacts by the time the first case is recognized.
f. Investigation of contacts and source of infection: Occurrence of a single paralytic case in a community should prompt an immediate investigation. Thorough search for additional cases of AFP in the area around the case assures early detection, facilitates control and permits appropriate treatment of unrecognized and unreported cases.
g. Specific treatment: None; attention during the acute illness to the complications of paralysis requires expert knowledge and equipment, especially for patients in need of respiratory assistance. Physical therapy is used to attain maximum function after paralytic poliomyelitis and can prevent many deformities that are late manifestations of the illness.

3. Epidemic measures

In countries undertaking polio eradication, a single case of poliomyelitis is considered a public health emergency. At the time of case investigation, public health authorities will determine the need for supplemental immunization programs in the community.

4. International measures

a. Poliomyelitis is a Disease under Surveillance by WHO and is targeted for eradication. National health administrations are expected to inform WHO of outbreaks promptly by telephone or electronic communication, and to supplement these reports as soon as possible with details of the nature and extent of the outbreak. Primary isolation of the virus is often best accomplished in the national laboratory designated to be part of the Global Polio Eradication Laboratory Network. Once identified, molecular epidemiology can often be used to trace the source of the outbreak. Countries are expected to submit monthly reports on polio and AFP cases to their respective WHO offices.

   The Pan American Health Organization (PAHO) had set the goal of eradicating polio from the Americas by the end of 1990. An independent international commission has certified that no locally acquired cases of polio have occurred in the Americas since August 1991.
b. International travelers visiting areas of high prevalence should be adequately immunized.
c. WHO Collaborating Centres.